

INTERNATIONAL STANDARD

OPC unified architecture -
Part 13: Aggregates

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

[IEC 62541-13:2025](https://standards.iteh.ai/catalog/standards/iec/83011007-b196-4710-90db-be1126302d29/iec-62541-13-2025)

<https://standards.iteh.ai/catalog/standards/iec/83011007-b196-4710-90db-be1126302d29/iec-62541-13-2025>



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2025 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Secretariat
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search -

webstore.iec.ch/advsearchform

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, ...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch

Discover our powerful search engine and read freely all the publications previews, graphical symbols and the glossary. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 500 terminological entries in English and French, with equivalent terms in 25 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

[IEC 62541-13:2025](https://standards.iteh.ai/catalog/standards/iec/83011007-b196-4710-90db-be1126302d29/iec-62541-13-2025)

<https://standards.iteh.ai/catalog/standards/iec/83011007-b196-4710-90db-be1126302d29/iec-62541-13-2025>

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD.....	3
1 Scope.....	6
2 Normative references	6
3 Terms, definitions and abbreviated terms	6
3.1 Terms and definitions	6
3.2 Abbreviated terms	9
4 Aggregate information model	10
4.1 General.....	10
4.2 Aggregate Objects	10
4.2.1 General	10
4.2.2 AggregateFunction Object.....	11
4.3 MonitoredItem AggregateFilter	13
4.3.1 MonitoredItem AggregateFilter Defaults	13
4.3.2 MonitoredItem Aggregates and Bounding Values	13
4.4 Exposing Supported Functions and Capabilities	14
5 Aggregate specific usage of Services	15
5.1 General.....	15
5.2 Aggregate data handling	15
5.2.1 Overview	15
5.2.2 ReadProcessedDetails structure overview	15
5.2.3 AggregateFilter structure overview	15
5.3 Aggregates StatusCodes	16
5.3.1 Overview	16
5.3.2 Operation level result codes	16
5.3.3 Aggregate Information Bits	17
5.4 Aggregate details	18
5.4.1 General	18
5.4.2 Common characteristics	18
5.4.3 Specific aggregated data handling	21
Annex A (informative) Aggregate examples	64
Figure 1 – Representation of Aggregate Configuration information in the AddressSpace.....	14
Figure 2 – Variable with Stepped = False and Simple Bounding Values.....	23
Figure 3 – Variable with Stepped = True and Interpolated Bounding Values	24
Table 1 – Interpolation examples.....	7
Table 2 – AggregateConfigurationType Definition	10
Table 3 – Aggregate Functions Definition	11
Table 4 – AggregateFunctionType Definition	12
Table 5 – Standard AggregateType Nodes	12
Table 6 – ReadProcessedDetails	15
Table 7 – AggregateFilter structure	16
Table 8 – Bad operation level result codes	16
Table 9 – Uncertain operation level result codes.....	17

Table 10 – Data location	17
Table 11 – Additional information	17
Table 12 – History Aggregate interval information	19
Table 13 – Standard History Aggregate Data Type information	20
Table 14 – Aggregate table description	25
Table 15 – Interpolative Aggregate summary	27
Table 16 – Average Aggregate summary	28
Table 17 – TimeAverage Aggregate summary	29
Table 18 – TimeAverage2 Aggregate summary	30
Table 19 – Total Aggregate summary	31
Table 20 – Total2 Aggregate summary	32
Table 21 – Minimum Aggregate summary	33
Table 22 – Maximum Aggregate summary	34
Table 23 – MinimumActualTime Aggregate summary	35
Table 24 – MaximumActualTime Aggregate summary	36
Table 25 – Range Aggregate summary	37
Table 26 – Minimum2 Aggregate summary	38
Table 27 – Maximum2 Aggregate summary	39
Table 28 – MinimumActualTime2 Aggregate summary	40
Table 29 – MaximumActualTime2 Aggregate summary	41
Table 30 – Range2 Aggregate summary	42
Table 31 – AnnotationCount Aggregate summary	43
Table 32 – Count Aggregate summary	44
Table 33 – DurationInStateZero Aggregate summary	45
Table 34 – DurationInStateNonZero Aggregate summary	46
Table 35 – NumberOfTransitions Aggregate summary	47
Table 36 – Start Aggregate summary	48
Table 37 – End Aggregate summary	49
Table 38 – Delta Aggregate summary	50
Table 39 – StartBound Aggregate summary	51
Table 40 – EndBound Aggregate summary	52
Table 41 – DeltaBounds Aggregate summary	53
Table 42 – DurationGood Aggregate summary	54
Table 43 – DurationBad Aggregate summary	55
Table 44 – PercentGood Aggregate summary	56
Table 45 – PercentBad Aggregate summary	57
Table 46 – WorstQuality Aggregate summary	58
Table 47 – WorstQuality2 Aggregate summary	59
Table 48 – StandardDeviationSample Aggregate summary	60
Table 49 – VarianceSample Aggregate summary	61
Table 50 – StandardDeviationPopulation Aggregate summary	62
Table 51 – VariancePopulation Aggregate summary	63

INTERNATIONAL ELECTROTECHNICAL COMMISSION

OPC unified architecture - Part 13: Aggregates

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at <https://patents.iec.ch>. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 62541-13 has been prepared by subcommittee 65E: Devices and integration in enterprise systems, of IEC technical committee 65: Industrial-process measurement, control and automation. It is an International Standard.

This third edition cancels and replaces the second edition published in 2020. This edition constitutes a technical revision.

This edition includes the following technical changes with respect to the previous edition:

a) Multiple fixes for the computation of aggregates

- The Raw status bit is always set for non-bad StatusCodes for the Start and End aggregates.
- Entries in the Interpolative examples Tables A2.2 Historian1, Historian2, and Historian3 have been changed from Good to Good, Raw status codes when the timestamp matches with the timestamp of the data source.
- Missing tables have been added for DurationInStateZero and DurationInStateNonZero.
- The value of zero has been removed for results with a StatusCode of bad.
- Data Type was listed as "Status Code" when it is "Double" for both Standard Deviation and both Variance Aggregates.
- Rounding Error in TimeAverage and TimeAverage2 have been corrected.
- The status codes have been corrected for the last two intervals and the value has been corrected in the last interval.
- The wording has been changed to be more consistent with the certification testing tool.
- UsedSlopedExtrapolation set to true for Historian2 and all examples locations needed new values or status' are modified.
- Values affected by percent good and percent bad have been updated.
- PercentGood/PercentBad are now accounted for in the calculation.
- TimeAverage uses SlopedInterpolation but the Time aggregate is incorrectly allowed to use Stepped Interpolation.
- Partial bit is now correctly calculated.
- Unclear sentence was removed.
- Examples have been moved to a CSV.
- The value and status code for Historian 3 have been updated.
- TimeAverage2 Historian1 now takes uncertain regions into account when calculating StatusCodes.
- TimeAverage2 Historian2 now takes uncertain regions into account when calculating StatusCodes.
- Total2 Historian1 now takes uncertain regions into account when calculating StatusCodes
- Total2 Historian2 now takes uncertain regions into account when calculating StatusCodes
- Maximum2 Historian1 now takes uncertain regions into account when calculating StatusCodes
- MaximumActualTime2 Historian1 now takes uncertain regions into account when calculating StatusCodes
- Minimum2 Historian1 now takes uncertain regions into account when calculating StatusCodes
- MinimumActualTime2 Historian1 now has the StatusCodes calculated while using the TreatUncertainAsBad flag.
- Range2 Historian1 now looks at TreatUncertainAsBad in the calculation of the StatusCodes.
- Clarifications have been made to the text defining how PercentGood/PercentBad are used. The table values and StatusCodes of the TimeAverage2 and Total2 aggregates have been corrected.

The text of this International Standard is based on the following documents:

Draft	Report on voting
65E/1059/CDV	65E/1098/RVC

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

Throughout this document and the other parts of the IEC 62541 series, certain document conventions are used:

Italics are used to denote a defined term or definition that appears in the "Terms and definitions" clause in one of the parts of the IEC 62541 series.

Italics are also used to denote the name of a service input or output parameter or the name of a structure or element of a structure that are usually defined in tables.

The *italicized terms and names* are, with a few exceptions, written in camel-case (the practice of writing compound words or phrases in which the elements are joined without spaces, with each element's initial letter capitalized within the compound). For example, the defined term is *AddressSpace* instead of Address Space. This makes it easier to understand that there is a single definition for *AddressSpace*, not separate definitions for Address and Space.

A list of all parts in the IEC 62541 series, published under the general title *OPC Unified Architecture*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.